

Title: Non-Volatile Magnetic Memory Device

Abstract

5 A non-volatile magnetic memory cell having a magnetic element with multiple segments which are not co-linear. Each of the segments is magnetized with a remnant magnetic field using a single write line. The segments can be magnetized in a first direction or a second direction, corresponding to first and second orientations of the memory cell. A sensor is provided to determine the direction in which the

10 segments are magnetized and thereby the orientation of the cell. The segments are oriented such that the magnetic flux fields created by their respective remnant magnetic fields have a cumulative effect at a sensing region of the sensor. The cumulative effect allows a less sensitive sensor to be used than in known device. In various embodiments, the magnetic element can have a number of linear segments or a curved profile. In another embodiment, multiple magnetic elements are magnetized by a single write line. The multiple magnetic elements are arranged such that remnant magnetic field stored in them can be cumulatively sensed. In another embodiment, the magnetic element is arranged to be magnetized in a single general direction, but is shaped such that magnetic flux lines emanate from it in different directions. The different directions are arranged to direct flux lines through the sensing region of a sensor, which measures their cumulative effect.

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